Figure 1: Waveform of a conventional heart beat

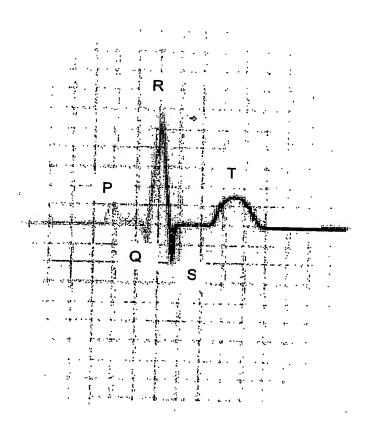


Figure 2: An example of computer and data acquisition device used for the present invention.

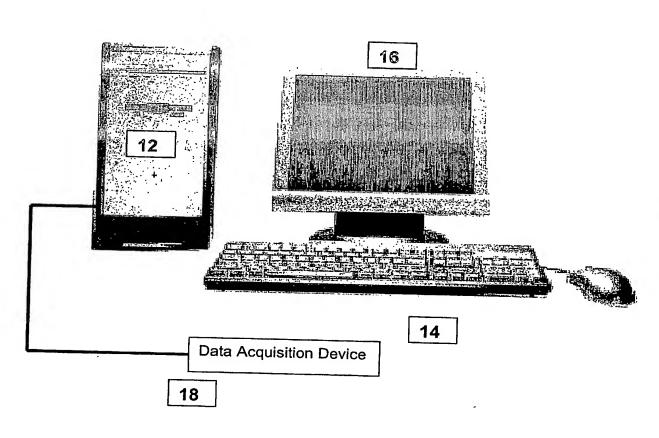
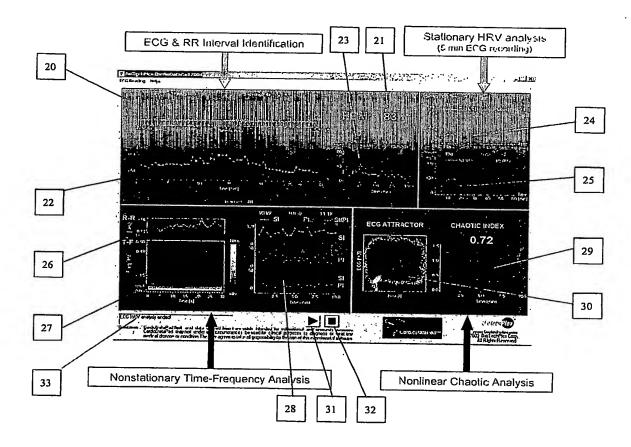
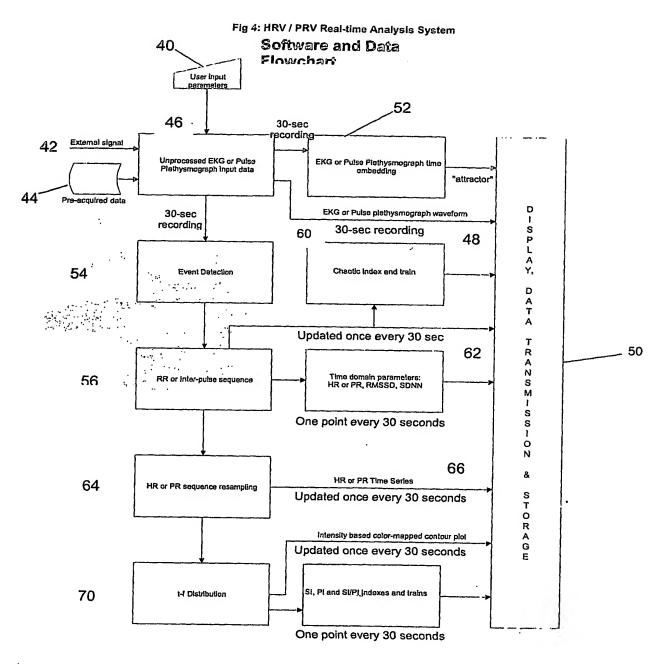


Figure 3: a picture showing the invention with the screenshot from the system performing HRC analysis on pre-acquired representation data from a healthy human.





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Fig 5
USER INPUT AND ECG ACQUISITION

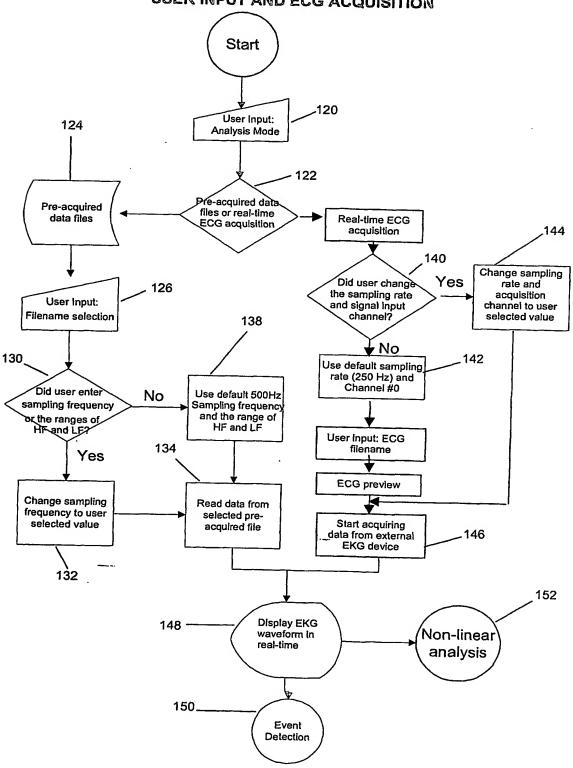


Fig 6: QRS EVENT DETECTION

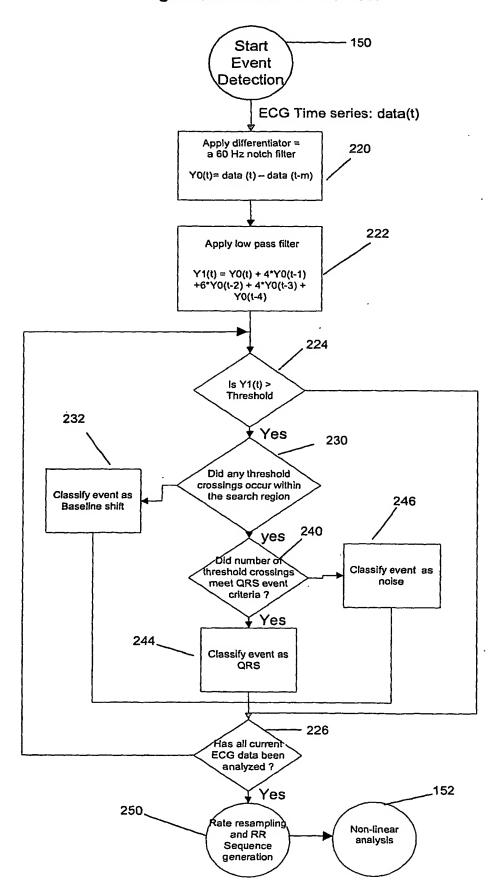


Fig 7: HEART RATE RESAMPLING AND SEQUENCE GENERATION ALGORITHM

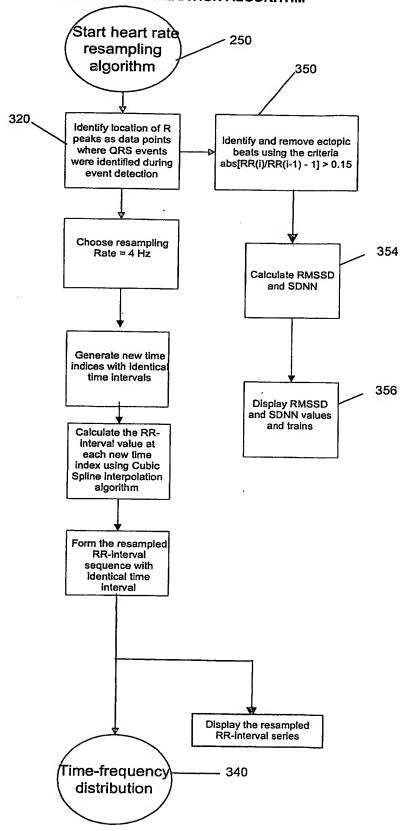


Fig 8: TIME-FREQUENCY DISTRIBUTION

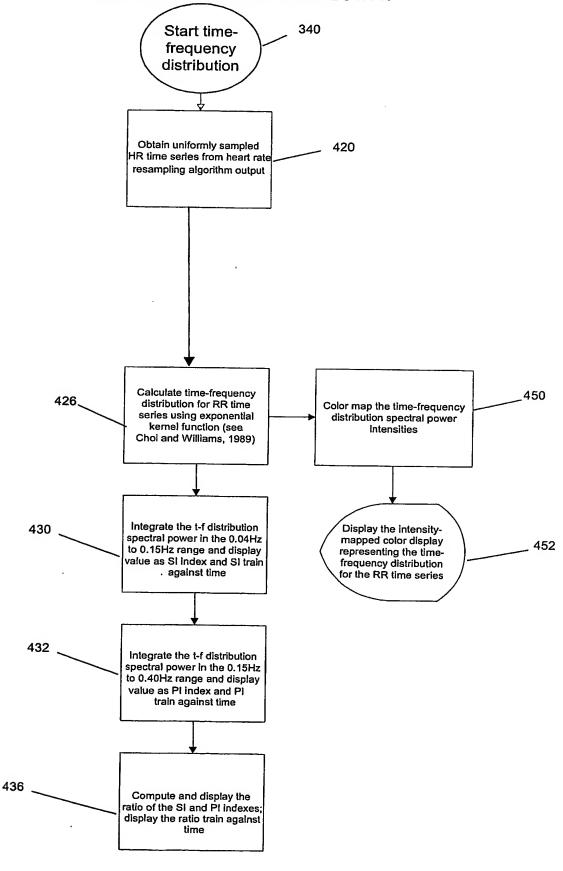


Fig 9 NON-LINEAR ANALYSIS Start nonlinear analysis 148 522 524 Generate a XY scatter plot ("ECG attractor") by using original EKG time series i.e. data(t) as the Y-coordinate data(t) EKG device or pre-acquired data waveform Display and its time-embedded "ECG Attractor" equivalent time series data(ttau) as the X- coordinate. The time delay tau = 2 EKG sample intervals 530 250 538 Generate a 2-dimensional XY time series ("RR attractor") by using original RR time series as the Ycoordinate and its time-RR time series embedded equivalent time series as the X- coordinate. Obtain principal axis vector The time delay = 2 RR sample intervals 540 532 For each point in the "RR attractor" time series Estimate Largest determine its closest Lyapunov Exponent neighbor and their "Chaotic Index" separation (see Wolf et. al. reference ?) 542 534 Does the separation exceed the Display threshold for "Chaotic Index" reorthonormalization? and its train against time Yes 536 Perform Gram-Schmidt reorthonormalization

Figure 10: An example of the results analyzed from the system performing HRV analysis on pre-acquired representative data for an electrocardiogram of a human subject with sleep apnea. N denotes normal breathing, A denotes apnea.

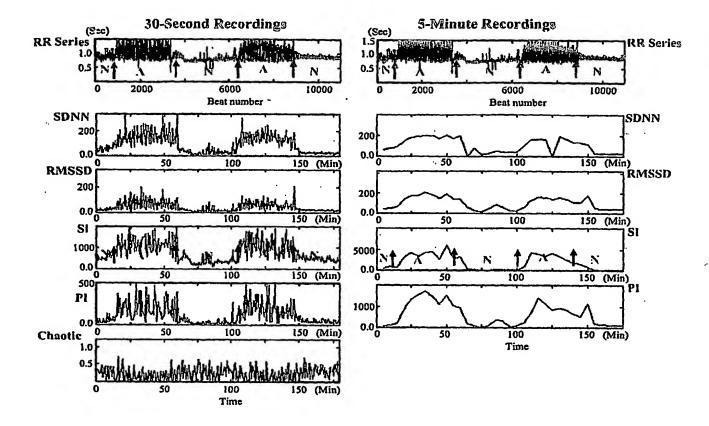
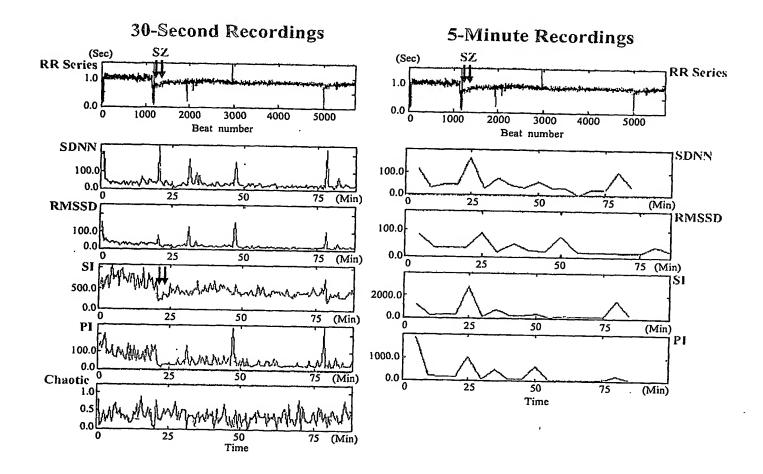


Figure 11: An example of the results analyzed from the system performing HRV analysis on pre-acquired representative data of an epileptic seizure episode electrocardiogram. SZ denotes time seizure occurs.



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Figure 12: An example of the results analyzed from the system performing HRV analysis on pre-acquired representative data for an electrocardiogram of a sedated baboon.

